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정책학석사학위논문

**Economic Growth, Government Policy,
and Regional Economic Inequality
in China**

중국의 경제 성장, 정부 정책과
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and Regional Economic Inequality
in China**

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ABSTRACT

Economic Growth, Government Policy, and Regional Economic Inequality in China

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This study is intended to serve two purposes. The first purpose is to study the tendency of regional economic growth in China during the period from 1978 to 2010, and the second purpose is to analyze how regional inequality is related to national economic growth and government policy. Through the calculation of the Theil Index, this study has found that the regional economic inequality was mild before the beginning of the 1990s and then became severe afterward. The review of literature and correlation analyses revealed that the regional economic inequality is highly associated with national growth and government policy. Regression analysis indicates that the regional economic inequality is positively related to national economic growth and negatively related to government policy. Since the beginning

of the 21st century, the Chinese government has been directing more efforts toward reducing regional economic inequality. Diverse government policies are carried out. The result shows a positive relation between economic difference among provinces and the implementation of the Western Development Strategy. Longer time period is required.

Key words: Regional Inequality, Government Policy, Economic Growth, Theil Index.

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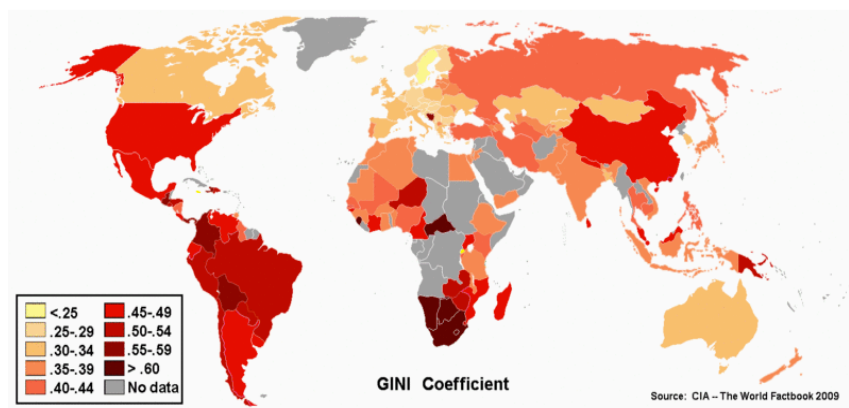
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1. Introduction

Economic inequality is one of the major concerns of governments across the world, as it may threaten national security and social stability. Graph 1 shows the distribution of the Gini Coefficient of countries. It is clear that inequality is of great importance to those developing countries that inherited regional imbalances as a result of colonialism, or implementation of the so-called “Marxist-Leninist” economic model states. For instance, India has made great economic performance in recent decades, however, in 2010, the number of people who lived below the poverty line reached 372 million, representing more than 30 percent of its total population of 1.16 billion. According to the data from the Federal State Statistics Service (FSSS) of Russia, the poverty-stricken population reached 21.1 million in 2010, representing about 15% of the total population (143.9 million). These countries demand a reduction in regional inequality. The trends, causes and solution of regional inequality have been the subject of heated debates.

Graph 1. Global Economic Inequality Map



A look at the economic data of previous centuries indicates that the standard of living and national wealth of different countries were similar. It was the same story from a domestic perspective. There existed relatively rich and poor areas, however, the economic difference between these areas were never as big as it is today. One reason for the increased disparity of wealth between regions is that we are living in an era of extraordinary material and spiritual richness. In time of prosperity, the distribution of social resource will be far more uneven than the distribution in time of less prosperity at an absolute level.

In China, when the country was established, different regions were quite similar and in a short period of time, their development even showed a trend of convergence (Zhou and Zhang, 2008). Entering into the 1980s, the gap between rich and poor in Chinese society sharply increased. If, decades ago, people at different locations had similar level of living condition, why don't they now? What had happened in this lapse of time that had made some areas richer and others relatively poor? What role did national development and government play in the transition? Understanding this socio-economic phenomenon of regional wealth disparity and finding answers to these questions above are academic endeavors that can ultimately help redress this uneven situation of human development.

China has been subject to several distinctive policy regimes since the establishment of the People's Republic of China (PRC) in 1949. Generally, China displays vast geographical disparities in the sectorial distribution of economic activity, living condition, resource base, and other determinants of income levels and economic growth. As showed in Table 1, the Gini Coefficient of China used to be above 0.4.

According to international standards, this coefficient indicates a great gap between rich and poor. Although the data showing a tendency to decline, for China, which has the largest population in the world, it is necessary to seriously consider the figure again. The review and study of the path of China's regional economic difference become interesting and important. The analysis of the trend of regional inequality no doubt will provide some hints on how to deal with it.

This study generally is concerned about two issues: first, whether the economic gap among regions is going up in recent decades; second, although the expansion or shrink of regional inequality must be a process that was the result of the combined effects of a lot of factors, how the economic development in regions relates to national economic growth and government policy is another concern.

Table 1. The Gini Coefficient of China from 2003-2012

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gini	0.479	0.473	0.485	0.487	0.484	0.491	0.490	0.481	0.477	0.474

Data Source: The Press Conference on January 18th, 2013, during which the National Economic Performance of China in 2012 was introduced by the Commissioner of National Bureau of Statistics.

Before the adoption of the Reform and Opening up policy, China focused on political struggle and military issues, and the national economy was in stagnation and economic data were either absent or lacked reliability. Thus, this study works on the period from 1978 to 2010.

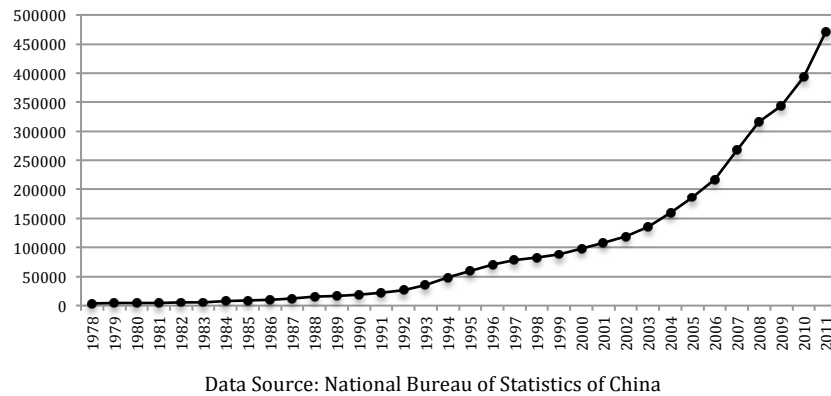
The trend of economic difference among different areas will be studied and particular indicators will be induced to calculate the degree to which the regional

economies are different in China. In retrospect to the previous studies, how the local economies grow divergently in regions, and, in the process, the relation between national economic growth, government policy, and inequality will be studied. As a large economic disparity definitely will harm the society and the national economy, in China, the central government is trying to control the imbalance in relatively appropriate scale. Expecting to find a specific bond between regional economic inequality and government policy in China, the Western Development Strategy will be reviewed and its effect is going to be measured. To start this investigation, the economic development of regions in China is discussed.

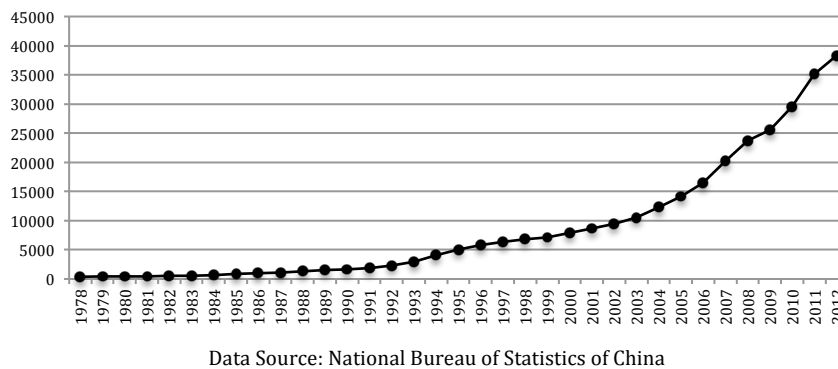
2. China's Regional Economic Inequality

The high-speed accumulation of material wealth is becoming a feature of the world. China is not the exception to this global pattern. In about half a century, China has gone through a process of rapid economic growth. Especially entering in the 1980s, the average growth rate keeps being higher than 8%. The trend of the national growth can be seen in Graph 2 and Graph 3.

Graph 2. National GDP of China (100 Millions RMB)

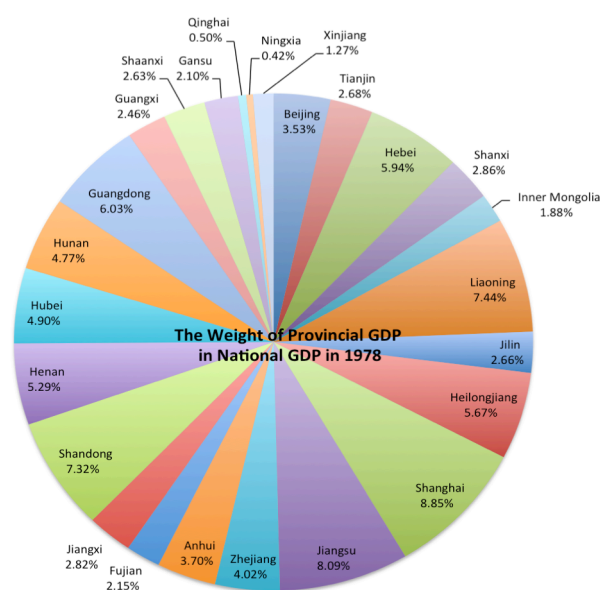


Graph 3. National GDP Per Capita of China (RMB)



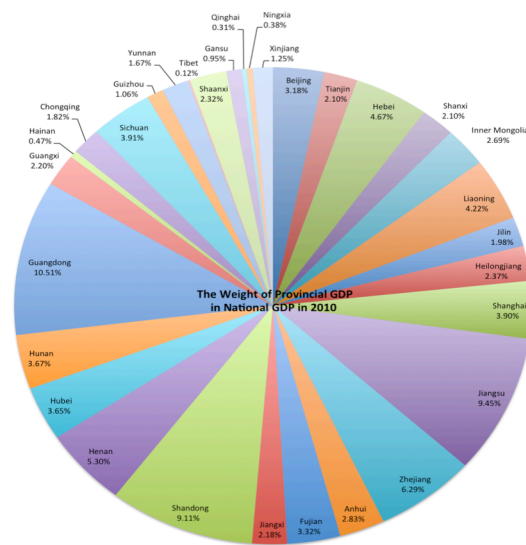
The country is growing fast, however, the distribution of the fortune among regions is very uneven. Especially, there exists a great discrepancy in the fortune of the different provinces. It seems that the trend of the unbalanced development even becomes more and more obvious recently. From the following graphs (Graph4 and Graph 5), the big shareholders of the whole national GDP in 1978 were Jiangsu province (8.09%), Shandong province (7.32%), Guangdong province (6.03%), and their shares in 2010 grow even bigger (respectively 9.45%, 9.11% and 10.51%); on the other hand, provinces with small share in the national GDP in 1978, such as Ningxia province (0.42%), Qinghai province (0.50%), Gansu province (2.10%), saw their parts shrink in 2010 (respectively 0.38%, 0.31% and 0.95). The provincial economies seemed to have developed with huge unbalance.

Graph 4. Share of Provincial GDP of National GDP of China in 1978



Data Source: China Statistical Yearbook

Graph 5. Share of Provincial GDP of National GDP of China in 2010



Data Source: China Statistical Yearbook

To view the regional economic inequality of China comprehensively, the local economic development will be analyzed with two units: one is province, and the other one is region. A region includes several provinces. More specific information about provinces in China will be introduced later.

2.1 Regional Patterns of Economic Growth in China

China can be organized into three parts: the eastern area, central area and western area¹. For long, because of its superior natural conditions, location advantages and

¹ The three parts are organized as follows: *Eastern area*: Beijing, Hebei, Liaoning, Fujian, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Guangdong and Hainan; *Central area*: Jilin, Heilongjiang, Shaanxi, Henan, Anhui, Jiangxi, Hubei and Hunan; *Western area*: Inner- Mongolia, Xinjiang, Ningxia, Gansu, Shanxi, Qinghai, Tibet, Guangxi, Sichuan, Chongqing, Guizhou and Yunnan.

preferential policies, the eastern area always had a higher economic growth rate than the other areas. From 1991 to the present, except for a few years, the annual GDP per capita of the central area only accounts, on average, for about 40% of the GDP per capita of the eastern area. The western area performs even worse. The average annual GDP per capita of the western area only reaches about 30% of the GDP per capita of the eastern area. In comparison, the economic indicators of the three areas in previous periods are less different. For instance, in 1985, the proportions of the GDP of the three areas amounted respectively to 51.96%, 29.69%, and 18.35% of the total GDP of the country. In 2005, they changed to 59.52%, 23.49% and 16.99%.

Table 2. GDP Per Capita of East, Middle and West China (In RMB)

Year	1980	1990	2000	2002
East	598	2240	11334	14363
Middle	391	1338	5982	7047
West	308	1156	4687	5536
Middle/East	65%	60%	53%	49%
West/East	52%	48%	41%	39%

Data Source: National Bureau of Statistics of China

Table 3. Total GDP of East, Middle and West China in Different Years
(In 100 million RMB)

Year	1978	1988	1998	2002	2005
East	1743.59	7608.49	46211.5	68289.06	117003.90
Middle	1006.65	4069.82	21921.37	29650.69	46171.40
West	654.23	2580.73	14647.38	20080.93	33390.30

Data Source: National Bureau of Statistics of China

Associated with the level of economic development, the regional industrial structures in the eastern, central and western areas have different focus. In the eastern area, the second and third industries are well developed. In 1991, the weight

of the second and third industries in the total GDP of the eastern area was about 79.8%, and in 2004, the number reached 89.2%². The consumption levels of the urban and rural residents of the eastern coastal region rose, and the industrial structure in the eastern area was adjusted. Shanghai, Beijing, Guangzhou, Shenzhen and some other cities in the eastern area, developed their tertiary industry fast, as finance, insurance, information, consulting, and real estate industries took bigger and bigger share in the total regional GDP.

In the central and western areas, the biggest shareholder of the GDP was the first industry. Although in recent time, the weight of the first industry in the central area took a smaller part in the regional economy, compared to that of the eastern region, the number is still 7 or 8 percent higher.

In the western area, there is a relatively higher proportion of the third industry compared with the national average level. This does not mean, however, that the tertiary industry in the western area has been well developed. The high proportion of the tertiary industry is high because the agricultural industry grows slowly, the second industry is in stagnation, and the whole industrial system falls behind.

Generally, the western and central areas of China are traditionally distributed into resource-based industries, transportation, and retail business. Modern industries such as the communications and information industries, the finance industry, and high technology industry are weak. The modernization level in western and central areas is low compared with the national average level.

² The data come from National Bureau of Statistics of China.

From a historical perspective, the formation of industrial structure in the eastern, central and western areas had a vivid geographic feature and was heavily affected by the national policy. In the early period, around the end of the 1970s, the adoption of opening up policy was geographically favored. The eastern coastal area was chosen to be the test area for opening up to foreign investors, therefore it had the chance to get foreign investment and develop earlier than the other areas. As a consequence, the big amount of capital and high technology attracted labor nationwide.

On the other hand, the geographic advantage in the eastern area facilitated import and export. Because of exports, there was an industrial clustering effect and more favorite policies were carried out in the eastern area. East China rapidly grew to be the central point of the export industry and capital-intensive industries.

In contrast, most of the regions of the western and central area in China are inland, and this makes it harder to connect with the international market. For political and some other non-economic reasons, the opening up of the western and central areas went through a long period of time. Due to geographical disadvantage, inadequate funding, weak industrial base, and not being favored by the policy of the central government, the initial development in the western and central areas can only be resource-intensive industries or low-tech industries.

Table 4. Process of Opening Up of Regions from 1978 to 1993

Year	Region
1980	Shenzhen City, Zhuhai City, Shantou City and Xiamen City
1984	Tianjin City, Shanghai City, Dalian City, Qinhuangdao City, Yantai City, Qingdao City, Lianyungang City, Nantong City, Ningbo City, Wenzhou City, Fuzhou City, Guangzhou City, Zhanjiang City and Beihai City
1985	Pearl River Delta, Yangtze River Delta, Southern Fujian Triangle
1988	Liaodong Peninsular, Shandong Peninsular and Hainan Island
1990	Pudong District
1992	Wuhu City, Jiujiang City, Yueyang City, Wuhan City and Chongqing
1993	Hefei City, Nanchang City, Changsha City, Chengdu City, Zhengzhou City, Taiyuan City, Xi'an City, Lanzhou City, Yinchuan City, Xining City, Urumqi City, Guiyang City, Kunming City, Nanning City, Harbin City, Changchun City and Huhehot City

Data Source: The list of Open Areas in China, the Special Administrative Region Research Laboratory of the State Council of China

Entering into the 21st century, China's industrial structure started to show a new trend. In order to speed up the industrial structure upgrading, the eastern and coastal areas began to adjust to the regional industrial distribution. The central government of China also began to implement diverse policies. To transfer the resources and labor-intensive industries out of the eastern area and let the local government be able to focus on high-tech industries and high-end manufacturing industries, and to allow the western and central areas to get benefit from the industrial transfer, the central government adopted the Western Development Strategy, the Rise of Central China Plan and some other policies.

In the period from 2000 to the present, the regional transport, communication, and energy infrastructures had been gradually upgraded in the western and central areas of China. The institutional environment, investment environment, and market environment were improved. The inherent geographical disadvantages became less influential. With the abundant natural resources and low cost of land and labor, the

inland came to be the ideal location to undertake large-scale construction of industries.

Table 5. Industrial Feature of Three Areas

Region	Feature of Industry
Eastern Area	Knowledge concentrated industry and Technology-intensive industry
Central Area	Capital-intensive industry and Resource-intensive industry
Western Area	Resource-intensive industry and Labor-intensive industry

Source: *About The Problems in Regional Industrial Structure Upgrading of China* (Zhang, 2008)

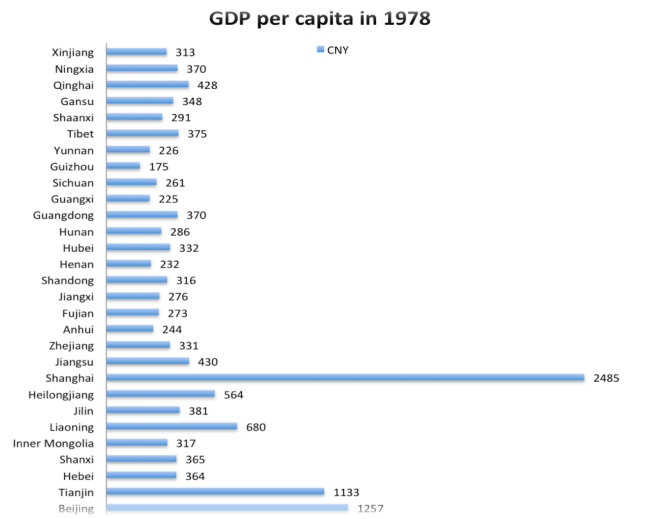
As a result, according to national statistics, since the implementation of large-scale development of the western region in the early 2000s, about 10,000 enterprises moved from the eastern areas to the western areas and the total investment reached 300 billion RMB. At the same time, the western and the northeastern regions became new hot spots for foreign investments. In 2005, the actual use of foreign direct investment (FDI) in eastern, central and western areas were respectively 73.5 billion dollar, 9.6 billion dollar, and 4.6 billion dollar. In 2005, all 13 provinces having the fastest growing investment were concentrated in the central and western areas, according to the reports about national industrial structure from the National Development and Reform Commission.

With the general knowledge of the regional inequality of areas in China, the map of China's regional inequality can be drawn in smaller geographical units as provinces. A province (called "Sheng" in Chinese) is the highest-level of China's administrative division. There are thirty-three such divisions, classified as twenty-two provinces, four municipalities, five autonomous regions, and two special administrative regions.

Here, the only concern is about the mainland of China, and we will treat the municipalities and autonomous regions as province too. Thirty-one provinces are going to be considered in this study. They are Beijing, Tianjin, Shanghai, Chongqing (became a municipality in 1997), Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan (became a province in 1988), Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

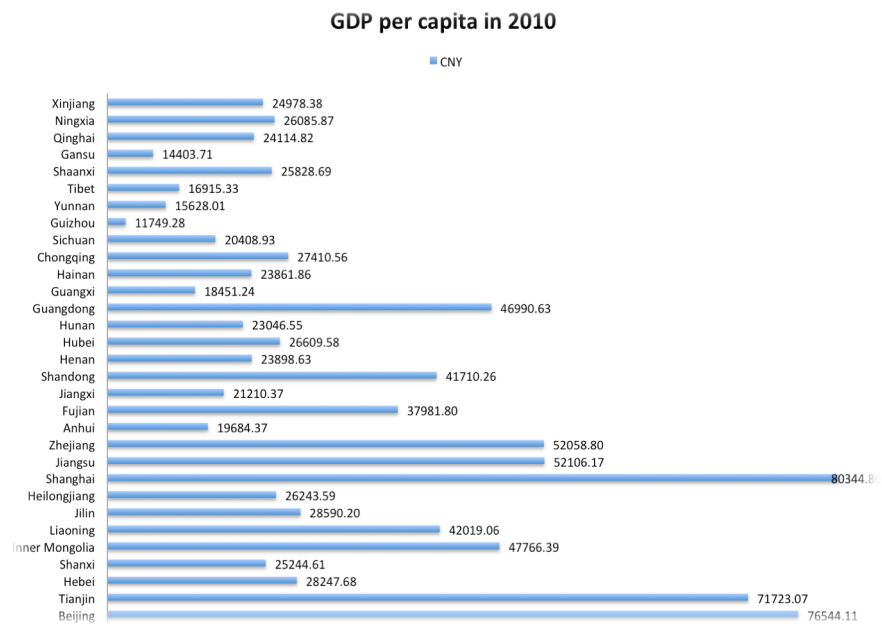
Since the number of provinces is large and the provincial economic structures are diverse and multiple, the regional disparity among provinces won't be described narratively. Instead, data of GDP per capita of provinces in 1978 and 2010 are graphed below (Graph 6 and Graph 7). Economic difference among provinces of every year of the period from 1978 to 2010 will be quantified in Chapter 3 and analyzed carefully in subsequent sections.

Graph 6. Provincial GDP Per Capita of China in 1978



Data Source: China Statistical Yearbook

Graph 7. Provincial GDP Per Capita of China in 2010



Data Source: China Statistical Yearbook

2.2 Definition of the Theil Index

Till now, there exists a blurred image about China's unbalanced economic development in different regions. In the previous sections, no matter which measures were adopted, the same conclusions concerning the unevenness in regional economic development of China were drawn. Some studies are consistent with the conclusion. For example, Shindo (2010) analyzes the effect of education subsidies from central government and suggests that the subsidies contribute to the increase of regional inequality; Wei (1999) reviews different studies on Chinese regional disparity and argues that the inequality is getting larger and it is affected by multiple variables; Kanbur and Zhang (2005) states that the government policy in different time periods have all contributed to increase inequality.

Inversely, some studies believed that there is a trend of decreasing inequality in China. For example, Jian, Sachs and Warner (1996) suggest that the regional economies in China generally are getting more and more similar; Zhou and Zhang (2008) also come to a similar conclusion: the regional inequality is reduced in the process of national development. The study of Wu and Li (2010) finds that the evolution of the regional economic inequality in China shows a "U" shape, and 1990 is the turning point. The results of studies in the field are various and inconsistent.

One of the reasons for this inconsistency in the results of the studies about regional economic inequality in China is that these studies employ diverse time periods. Most importantly, the lack of consistency is due to the various approaches and measures.

Most of the studies used the Gini Coefficient or other indicators as GDP, regional income, amount of investment, which directly come from official statistic reports of Chinese government, as the measure of the level of inequality. Some apply a single indicator, and others utilize several indicators. Different measures yield different outputs.

In order to investigate how China's regional economic inequality is going and how some factors are related with it, a numerable indicator is pivotal. Unlike most of the studies on this topic, this study puts the same weights on the measure of inequality and relevant factors. As mentioned in the previous section, the Theil Index is relatively a comprehensive indicator. The formula of the Theil Index includes national and regional GDP per capita, national and regional population.

Thus, the calculation can reflect level of the economic development in specific region on the national scale, and the sum of the levels of each region presents the degree of regional inequality generally. The Theil Index has more validity and credibility compared with the other indicators. The conclusion based on the Theil Index will be expected to be more reliable. There is a need for more specific and clear knowledge of it.

The Theil Index was used to describe how regions exactly differed from each other and prove whether regions diverged more seriously after the reform and openness. As the Theil Index is derived from Shannon's measure of information entropy, it is also called the Theil's entropy measure. It is named after Henri Theil (Theil, 1967) for the use of the concept of entropy in information theory to calculate income gap in economic analysis. It is used as a measure of the income gap between individuals

or regions. In the meantime, the Gini Coefficient is widely known as a measure of economic inequality too. To explain the use of the Theil Index instead of the Gini Coefficient, it will require some interpretations of the Gini Coefficient first.

The Gini coefficient is an indicator that represents inequality of income distribution among countries, regions, races, or within industries, but it is also widely used as the basic indicator by the majority of scholars to identify the fairness of the distribution of income inside a country. The principle of the Gini Coefficient is to count the share or part of social wealth that is distributed unequally from the total amount. Simply put, the Gini Coefficient calculates the percentage of the section between the Lorenz curve and the line of equality in the whole section below the line of equality. One of the important features of the Gini Coefficient is that it is relatively easy to calculate. People can use simple packets of data to summarize the line of Lorenz curve and reflect the income distribution status, then get the overall income gap.

There are some limitations to the Gini Coefficient. For example, the simplicity of the calculation process can be both an advantage and disadvantage of it. Because of the generalization, there is possibility that the index will lose some of the information when it is representing economic inequality. The Lorenz curve cannot be precisely described. Thus, the measurement of income distribution can be rough. Another shortcoming of the Gini Coefficient is that the economic structure has great influence on the outcome of the Gini index.

In the process of calculating the Gini Coefficient, the individuals in the sample would be set in order and sort in categories. Thus, two regions that have similar level of equality of income distribution may have very different Gini Coefficients, which are

affected by the level of the industrial development of the regions. Besides, the number of categories of the units in the sample has a huge influence on the degree of accuracy in the calculation. Another limitation of using the Gini Coefficient is that it is a combined indicator of economic divergence, which means it can show the general situation of economic inequality, but it cannot represent specific aspects of income distribution.

Compared with the Gini coefficient, the Theil Index is very sensitive to the changes in the upper income level. On the other hand, the Gini coefficient is particularly sensitive to the changes of the level of middle-income. Another advantage of the Theil Index itself is that there is no categorization procedure in the calculation, which will increase the accuracy of the result compared with the Gini Coefficient.

The most important reason to choose the Theil Index as the main indicator is that it measures divergence of economic growth in domestic environment as well as the gap among groups. It can measure the gap within each group and count the contribution of the difference to the total divergence. Above all, the Theil Index has the ability to represent distribution situation into two sectors as the economic inequality inside region and inequality among regions.

The interest in this research project is to observe the unbalance of economic development among regions, using GDP per capita of each region in the calculation process, and the economic inequality within regions will be ignored. Thus, the result of the calculation will be a single indicator purely showing economic disparity among regions. Additionally, to measure the distribution of inequality in a country such as China, with such a huge population, selecting samples can never be the best

method, for the sake of reliability of the indicator. With all these reasons showed above, the Theil Index will be the main indicator in this research.

The original formula of the Theil Index is as follows:

$$T_t = \frac{1}{N_t} \sum_{i=1}^m \sum_{j=1}^{Nit} \frac{y_{ijt}}{\bar{y}} \ln \left(\frac{y_{ijt}}{\bar{y}} \right) \quad (2.2.1)$$

y is the personal per capita income;

N is the world population;

i is the country;

j is the individual;

t is the time;

\bar{y} is the world average per capita income .

The variables are going to measure economic growth in regions, although the change of personal income can reflect some aspect of regional development. Here, the income data will be replaced with more macroeconomic data – GDP. Thus, personal per capita income should be replaced with GDP per capita in specific region. Putting the formula in the circumstance of a country, it changes to

$$T_t = \frac{1}{N_t} \sum_{r=1}^m \sum_{j=1}^{Nrt} \frac{y_{rjt}}{\bar{y}} \ln \left(\frac{y_{rjt}}{\bar{y}} \right) \quad (2.2.2)$$

y is the GDP per capita³ of specific region;

n is the regional population⁴;

N is the national population;

r is the region;

j is the individual;

t is the year;

\bar{y} is the national GDP per capita.

The main geographical unit in this study is province, so temporarily, region is replaced with province. In addition, as the GDP per capita in a region is the same for every person, the first sum calculation can be simplified. Then the calculation function of the Theil Index will be converted as:

$$T_t = \frac{n_t}{N_t} \sum_{r=1}^r \frac{y_{rt}}{\bar{y}} \ln \left(\frac{y_{rt}}{\bar{y}} \right) \quad (2.2.3)$$

y is the GDP per capita of each province;

n is the provincial population;

N is the national population;

r is the province;

t is the year;

³ GDP Per Capita: The nominal gross domestic product per capita of provinces directly presented in this study is from the provincial Statistical Yearbooks. The data used in the calculation of the Theil Index are obtained from the provincial GDP and the provincial population from Statistical Yearbooks of each province. National GDP per capita used in the calculation comes from China Statistical Yearbook.

⁴ Population: The population of provinces is from the provincial Statistical Yearbooks. The total national population is the sum of provincial population from the Statistic Yearbooks of the provinces.

\bar{y} is the national GDP per capita.

The simplified function that will be used to calculate the Theil Index is expressed as follows:

$$T = \frac{n}{N} \sum_{r=1}^r \frac{y_r}{\bar{y}} \ln \left(\frac{y_r}{\bar{y}} \right) \quad (2.2.4)$$

y is the GDP per capita of each province;

n is the provincial population;

N is the national population;

r is the province;

\bar{y} is the national GDP per capita.

Then to get the shape of the development of economic difference among the three areas of China, the formula of the Theil Index of areas is presented as follows:

$$T_t = \frac{n_t}{N_t} \sum_{r=1}^r \frac{y_{rt}}{\bar{y}} \ln \left(\frac{y_{rt}}{\bar{y}} \right) \quad (2.2.5)$$

y is the GDP per capita in each area;

n is the population of each area;

N is the national population;

r is the area;

t is the year;

\bar{y} is the national GDP per capita.

2.3 Regional Economic Inequality: 1978-2010

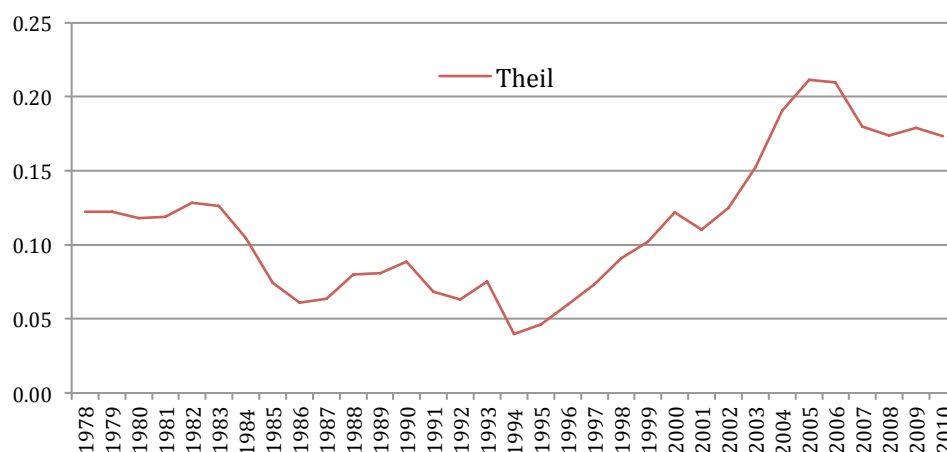
The result of the calculation of the Theil Index of China on province level is as follows:

Table 6. Theil Index on Province level from 1978 to 2010

Year	Theil Index	Year	Theil Index	Year	Theil Index
1978	0.122281	1989	0.080968	2000	0.122029
1979	0.122532	1990	0.088488	2001	0.110232
1980	0.118242	1991	0.068414	2002	0.125076
1981	0.119089	1992	0.063154	2003	0.152005
1982	0.128330	1993	0.075370	2004	0.190802
1983	0.126233	1994	0.039692	2005	0.211437
1984	0.104673	1995	0.046490	2006	0.209847
1985	0.074341	1996	0.059830	2007	0.179868
1986	0.060838	1997	0.073409	2008	0.173657
1987	0.063485	1998	0.090966	2009	0.178774
1988	0.079799	1999	0.101965	2010	0.173548

Data Source: Original Data are from China Statistical Yearbook and Statistical Yearbooks of different provinces.

Graph 8. Theil Index on Province level from 1978 to 2010



What needs to be reminded here is that the index calculated in this investigation only describes the economic difference among provinces. The original Theil Index showing economic inequality of country always includes two parts — one part is the inequality among individuals within one nation, and the other part is the disparity among national economies. In this study, as mentioned earlier before transforming the formula, the factor of individual income has been replaced with GDP per capita in particular province. The economic difference among individuals is ignored. Thus, the Theil Index showed above is only the measure of economic difference among provinces.

According to Graph 8, the Theil Index of the period from 1978 to 2010 shows a twisted “V” line. The lowest point appears in the year around 1994. The bigger the Theil Index, the larger the gaps among provincial economies are. From 1978 to 1986, the Theil Index kept going down. Between 1987 and 1994, the line was very stable, and the Index changed slightly and reached the point of 1994. From 1994 to 2010, the line went up sharply, reached the highest point in the year 2005, and slightly came down. The turning point occurs in the year 1994.

One can conclude that before 1994, the economic difference among provinces in China was getting small, which means there actually is a trend of convergence. After 1994, however, the gap among provincial economies kept expanding greatly. In other words, before 1994, the provincial economies in China showed a tendency of convergence, and after 1994, a trend of economic divergence among provinces emerged.

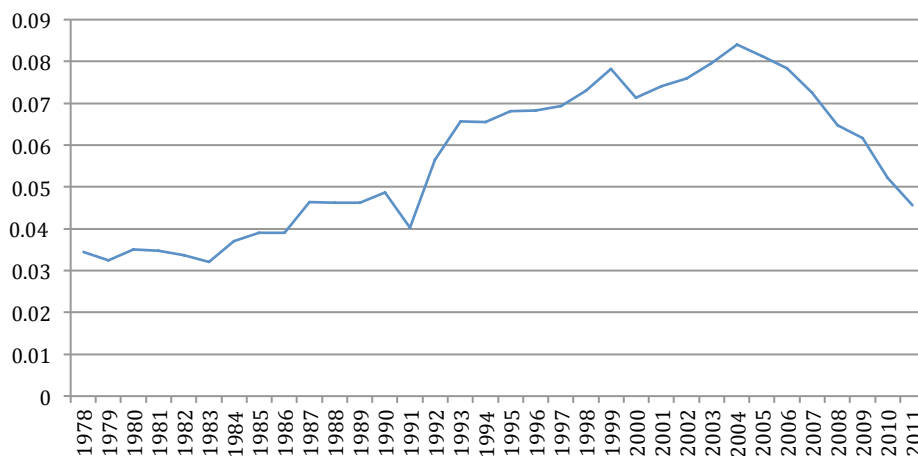
After describing the economic difference on provincial level, the disparity of regional economies among areas is calculated. As mentioned before, China can be divided in three big regions: eastern area, central area, and western area. The result of the calculation is presented in the following table.

Table 7. Theil Index on Area Level from 1978 to 2010

Year	Theil Index	Year	Theil Index	Year	Theil Index
1978	0.034481	1989	0.046291	2000	0.071393
1979	0.032522	1990	0.048657	2001	0.074109
1980	0.035105	1991	0.040313	2002	0.075972
1981	0.034779	1992	0.056452	2003	0.079531
1982	0.033723	1993	0.065656	2004	0.084092
1983	0.032075	1994	0.065489	2005	0.081250
1984	0.037019	1995	0.068164	2006	0.078424
1985	0.039066	1996	0.068196	2007	0.072550
1986	0.038994	1997	0.069349	2008	0.064769
1987	0.046437	1998	0.073051	2009	0.061685
1988	0.046280	1999	0.078191	2010	0.052146

Source: Original Data are from Statistical Yearbooks of China and Statistical Yearbooks of different provinces. The figures of regional level are calculated directly with the provincial data, and figures can be different from those the Chinese government officially announced.

Graph 9. Theil Index on Area Level from 1978 to 2010



From Graph 9, it seems that there is a growing economic difference in the period from 1978 to 2010. Before the beginning of the 1990s, the increase of regional economic disparity is relatively slow. From the 1990s to 2004, the trend still shows a divergence. For the recent several years, there is a tendency of convergence among the three regions. Compared with the line of economic difference among provinces, the three regions grew with a comparatively mild divergence. In the later part, provincial Theil Index will be called the Theil Index; regional Theil Index of areas will not be included in the analysis.

In conclusion, at the beginning of the 1980s, economic difference among the regions in China was mild. In the 1990s, the gap among regional economies greatly widened. Thus, the questions are why did the gap widen at the beginning of 1990s, what factors affected the emergence of regional economic inequality in China? Reviewing Graph 2 and Graph 3, one observes that although there is a little similarity between the outline of the Theil Index and that of national economic growth, their turning points are the same. The Theil Index has its lowest value at the time point around 1994, and from that time, the growth rate of the national economy of China accelerated quickly. A test is required. Before building the model of the variables, previous studies in this field are reviewed.

3. Literature Review and Research Framework

Regional inequality is one of the major subjects of studies in the field of development studies. There are a lot of studies on the relation between various relevant factors and economic inequality. For example, the impact of factors, such as natural resources, geographic location, capital investment, human capital, technology, market, institution and governmental behavior on inequality are studied intensively. This chapter organizes these studies into three categories: social explanations, economic explanations, and political and administrative explanations. A detailed analysis of these three categories explaining economic inequality is presented in the following sections.

3.1 Social Explanations of Inequality

The concept of inequality can be assessed from different angles. Although the concern in this study is economic inequality, relative factors are not limited to the economic field. Regional economic inequality is associated with a lot of social factors. For example, culture, race, class, and religion are all social factors that may have an effect on inequality.

Race is a hot issue studied in the sociological field. Using data from a 1995 national survey in Brazil, Telles and Lim (1998) find that the racial income inequality based on self-classification are underestimated to compare with those based on interviewer classification. They also state that interviewer classification of race is

more reliable because researchers of racial inequality are interested in the effects of racial discrimination, which always depends on how others classify one's race.

Comparing the direct relation between race and inequality, Wright (1978) argues that the racial difference observed commonly in returns to income is a result of the distribution of racial groups into class categories. They are contrary to Telles and Lim (1998)'s opinion, which strongly confirms that the income inequality between black and white males largely decrease when the regressions are applied within identical class.

Same as the correlation between race and inequality, the relation between religion and inequality is a very popular topic, too. Alexeev and Gaddy (1993) study the effect of religion on inequality. Using the data released by the U.S.S.R. in the 1980s, they found that inequality in the Soviet Union generally declined throughout the 1980s; and the areas with independent religion such as Baltic and Slavic republics have the lowest inequality; the southern republics who are Christian fall into the middle; and the Muslim republics show the greatest inequality in the Soviet Union. On the other side, Baltic the Slavic republics have highest per capita incomes, next are the Christian southern republics, and the Muslim republics unfortunately have the lowest income per capita.

Besides the impact of social factors on inequality, inequality can have counter effect on society. Alesina and Perotti (1996) contend that highly unequal societies arouse incentives of individuals in activities outside normal markets such as crime. The social progress and inequality go oppositely.

Stack (1984) works on the inequality-crime relationship in which the cultural issues act as intervening variables. He collects data of property crime from 62 nations to observe the strength of relationship between inequality and crime activity, and an egalitarian culture promoting the idea that inequality should not be tolerated. In the end, the results of the research do not support the assumption that inequality or the interaction between inequality and egalitarian culture has independent effects on property crime.

Besides, some studies present the vicious circle of increasing inequality and social instability. Puga (1999) has a comprehensive view of the growth of inequality. He proves that inequality and society share a close correlation with each other, and there exists a vicious circle of inequality in the process of national development. He observes a negative relationship between regional inequality and the degree of integration. In his research, industry spread across regions following the social progress, and workers migrate toward locations with more firms and higher real wages, which intensify agglomeration and social inequality.

There are numerous researches on the topic of interaction between inequality and varied social factors. For space limitation, it is impossible to review adequately all of them. The review of social explanations of inequality ends here and in the next section, economic explanations of inequality will be discussed.

3.2 Economic Explanations of Inequality

It is well known that economic growth and national development are not always going hand in hand, as the Secretary General of the United Nations Ban Ki-Moon said:

“While economic growth is necessary, it is not sufficient for progress on reducing poverty” (Melamed, Higgins and Sumner, 2010, page 1). The study of the correlation between economic factors and inequality has a long tradition in the economics literature. Economic factors include productivity, investment, human capital, import, export, market and so on.

Some studies work on the combined effect of economic factors on inequality, and some others work on specific economic factors. For example, Aghion, Banerjee, and Piketty (1999) analyze the impact of investment on inequality. They state that if there are decreasing returns of individual capital investments, and individual investments are an increased function of initial endowments, then the investment has low marginal return and it becomes available to reduce inequality by concentrating investment in fewer richer people.

Investment is an important factor that may influence regional economy and inequality, and regions will have different outputs from same amount of investment because of the differences in productivity. Fleisher, Li, and Zhao (2010) study how the regional dispersion is influenced by TFP growth, FDI, and other determinants. They contend that in the process of China’s national development, FDI has a larger effect on TFP growth before 1994, and, additionally, the telecommunication infrastructure has a positive effect on TFP growth.

Besides efficiency of production and capital flow from outside, another important factor of economic activity is human capital. Galor and Zeira (1993) study the mobility of human capital driven by the increasing economic inequality. They noticed that if the process of development is affected by human capital then

economic growth increases as investment in human capital increases. However, a lot of constraints prevent poor individuals from receiving high education. Truly, the economic growth can be heavily affected by the reduction in the number of individuals who are able to accept high education.

Similarly, Tamura (1996) tries to reveal how human capital correlates with inequality. He theoretically shows that regional differences in population and human capital may limit the growth of local economy. With markets expanding and growth accelerating, interregional human capital convergence produces a cumulative process of economic evolvement. The possibility for regional inequalities to fall can be expected to rise, as the total amount of knowledge available to all regions reaches a given level.

Unlike the researchers who focus on domestic influence of economic factors on inequality, Rodriguez-Pose and Gill (2006) observe the relationship between economic factors and inequality at an international level. They focus on the link between trade and regional disparities with data from eight major world economies. They find that trade and regional disparities are connected strongly when sectorial shifts in trade system are calculated. As the proportion of primary sector goods decrease in total trade, regional disparities are likely to increase.

Some scholars direct their attention to the impact of overall economic growth on inequality, instead of focusing on particular economic factors. The initial theoretical studies concentrate on the relationship between growth and inequality. The Kuznets hypothesis is significant. The hypothesis argues that the distribution of income would deteriorate over the initial stages of development, as an economy transforms

both from rural area to urban area, and from agricultural sector to industrial sector (Kuznets, 1955). He also finds a “long swing” of regional income inequalities in his analysis of income disparities. There is a rise and then a subsequent fall of income difference caused by urbanization and industrialization in the process of the national economic development.

Following the initial studies, Lucas (2000) studies the inequality specifically in the transition process of regional economies from stagnation to growth. He argues that regional economic inequality is a by-product of national development. Accordingly, economic inequality among regions within a country will initially increase, as the country starts growing, and then decrease when the national economy reaches a certain level. This statement matches the inverted U curve described by Kuznets, and is more specific.

Additionally, a prior paper by Lucas (1988) builds on the idea that the externalities are central to endogenous growth. In other words, divergence of accumulation of physical capital, human capital, and other productive factors of different regions are important to national growth. This means inequalities among regions are associated with the growth of a country, and growth is heavily influenced by the accumulation of productive factors.

The literature above all agree with that there is a relation between growth and inequality. However, more recently, Deininger and Squire (1996), Chen and Ravallion (1997), and Dollar and Kraay (2002) all suggest that economic growth does not significantly influence economic inequality. Based on the Gini Coefficients released by the World Bank, Deininger and Squire (1996) find that there exists a

strong positive relationship between growth and reduction of poverty, instead of a systematic link between growth and changes in aggregate inequality. Chen and Ravallion (1997) observe that the average living standard, but not the national economic growth, has an impact on inequality. Dollar and Kraay (2002) contend that economic growth may have an impact on reducing extreme poverty, but it hardly has an effect on shortening the distance between the poor and the rich. All the studies would suggest that there is no virtuous circle between higher growth and falling inequality levels.

Regardless of being a social and economic phenomenon, inequality cannot avoid the influence from political factors and government activity. There is a necessity to review the studies on the correlation between inequality and political or administrative factors.

3.3 Political and Administrative Explanations of Inequality

As same as studies focusing on the social and economic, studies of inequality accessing political and administrative factors also address a wide range of variables.

Most of the studies on political factors focus on political ideology, politic intervention, political tensions, and behavior of political parties. In study on regional inequality in Europe, Bjørnskov (2008) suggests that the association between income inequality and economic growth rate might arguably depend on the political ideology of governments. The result of his research shows that in European countries, inequality is negatively associated with growth under leftwing governments while the association is positive under rightwing governments.

Instead of focusing their attention on European countries, Kanbur and Venables (2005) analyze the spatial inequalities in over 50 developing countries. They find that spatial inequality, as a dimension of overall inequality, has particular significance when spatial and regional divisions align with political and ethnic tensions. The opinion that policy interventions that ensure a more spatially equitable allocation of infrastructure and public services are necessary is presented in their research.

As important as political factors, administrative factors are frequently mentioned in the studies of inequality. Studies work on the impact of government behavior on inequality. For example, Stack (1978) argues that the degree of direct government involvement in the market may reduce income inequality through full employment. The result of regression analysis of cross-nations data in the study points out that the degree of direct government involvement is the single most important factor associated with small income inequality. The relationship between them is independent.

Atkinson (2000) investigates the inequality of distribution in OECD countries. He studies the effect of the government budget, particularly taxes and transfers, in explaining the growth of inequality. The research shows that although government budget is not the most important factor that influences distribution of economic growth, the release of it plays an important role in the redistribution and has impact on inequality.

Linear relation between inequality and government policy is not that obvious to some scholars. Tanninen (1999) suggests that there is a non-linear relationship between growth and government spending on public goods. While the fiscal policy approach derives two processes from higher income inequality to higher redistribution and from redistribution to reduced growth. The regional inequality decided by both economic and political factors. And there is a counter effect of inequality on economic growth and government spending.

The most important revenue of government is tax. Alesina and Rodrick (1994) study the association between tax and inequality. They observed that redistributive taxation is negatively related to economic growth because of their negative effect on capital accumulation, which means that inequality decreases while the taxation increases.

Specially focusing on the inequality in China, Kanbur and Zhang (2005) concentrate on the trends of government policy in different time periods to show how the policies push the regional economies grow divergently. Jian, Sachs and Warner (1996) find that the tendency of economic convergence is strongly associated with the implementation of Reform and Opening up promoted by the central government of China. Shindo (2010) analyzed the effect of education subsidies from the central government and suggests that the different impacts of subsidies in different regions enlarge the inequality between them. Wu and Li (2010), first, measure how the regional economic inequality changes with the unit as province, and, second, they construct analysis of the formation of economic inequality from both regional and industrial perspectives.

Besides, some other studies look at even wider ranges of the topic. Lessman (2012) analyzes the impact of political and fiscal decentralization on regional inequalities. Fuchs and Demko (1979), and Schiffer (1985) work on the feature of regional inequality in the former USSR countries, exactly on the impact of socialism system on inequality.

Based on the literatures reviewed above, one can observe that the relations between social, economic, political, and administrative factors, on the one hand, and inequality, on the other hand, are sophisticated. To assess how different factors relate to regional inequality in China, specific tests are needed.

3.4 Research Framework

Based on the output of measurement in Chapter 2, the following analysis will focus on the possible explanation of regional inequality in China. As reviewed in the previous section, the factors of inequality can be categorized as social factors, economic factors, and political and administrative factors, a discussion of which in the context of China follows.

As a socialist country, China applies a one-party political system. The study of political influence in Chinese social and economic life has great complexity. The lack of transparency makes the analysis of political factors and inequality not applicable.

On the other hand, compared with western countries, China has a relative integrity of citizen's religion and race. Additionally, although there is a difference of income between male and female, gender is not an obvious factor that influences personal

income in Chinese society. All in all, this study is not going to investigate the relation between social factors and regional inequality.

Contemporarily, the two biggest features of China may be the high-speed economic growth and the powerful government regulation and control in the national economy. Under the special socialism system, China's economy has no way but to attract people's attention. This study plans to work on the relation between national economic growth, government policy, and regional inequality. The details of the analysis will be presented in the following sections. Before that, it is necessary to introduce the data and variables used in this study.

Regional Economic Inequality: There are a lot of versions of the definition of regional economic inequality. Generally, it means the differences between economic performance and welfare between countries or regions (OECD 2002, 2003). It is also referred to regional economic disparity, regional economic inequality, and regional economic gap. Generally, regional economic inequality indicates the degree to which a given economic phenomenon differs between regions, and within a given country. Regional unemployment and per capita income are used as important indexes of the prosperity or poverty of a region, and an indicator such as the Gini coefficient is used to quantify regional inequality.

In this study, regional economic inequality is defined as the degree to which regional economies grow differently from each other at a macroeconomic level. Precise patterns of regional economy as industrial structures, improvement of welfare, degree of marketization, urbanization, and some other particular section are not of

concerns in this study. Regional economic growth is measured by regional GDP and GDP per capita.

Economic Growth: Economic growth usually refers to the increase of regional or national per capita output levels in a long time period. The growth rate of the total economy reflects the level of economic growth of a country or region during a given period. The concept of economic growth also measures the growth of the overall economic strength of a specific country or region. GDP and GDP per capita are the indicators to represent economic growth. In this study, the phrase “economic growth” refers to national economic growth.

Most of the nominal gross domestic product directly used in tables or graphs in this study is from China Statistical Yearbook, Statistical Yearbooks of provinces, and other official reports from National Bureau of Statistic of China. The provincial GDP used in the calculation of the Theil Index comes from the Statistical Yearbooks of provinces. The total GDP of China used in the calculation of the Theil Index is the sum of provincial GDP from provincial Statistical Yearbooks.

Government Policy: Government policy refers to the act of orienting or guiding of the government, via rules, principles, public policy and other means. In this study, it particularly represents the determination and will of the central government in the national economic sector. Government expenditure is the indicator used to reflect the intention of central government, to guide the expected direction, trend or movement of the national economy.

The total expenditure of the central government comes from China Statistical Yearbook, and the data of local expenditure and central expenditure are from the same source. The share and amount that the central government gives to local governments to support local developments in the total expenditure are respectively called “Local Percent” and “Local Expenditure”. The share and amount that the central government retains to maintain programs it promotes are respectively called “Central Percent” and “Central Expenditure”. Total Expenditure is the sum of local expenditure and central expenditure.

In China, unbalanced development is a strategy launched by the Chinese government. In the 1980s and 1990s, because of the weak industrial foundation and lack of capital, the central government of China decided to put the limited resources in the eastern coastal area to help them build up the local economy, and it expected to use the eastern coastal area as a point to start growing the national economy. After the national economic foundation was built, generally in the end of 1990s, the Chinese government decided to shift the focus from east to west. The policy of the central government in the period from 1978 to 2010 can be briefly described as the development of the east first and other areas later.

Western Development Strategy: Since the start of Reform and Opening up in 1978, spectacular economic development and poverty reduction in China are accompanied by sharp rises in inequality and frequent manifestations of social tensions through unrest of various types. In response to these rising inequalities, the Chinese government adopts many strategies and policies to rebalance regional economy and improve the wellbeing of residents in rural areas. For instance, the Chinese government starts shifting the preferable policies from east to west. In the

beginning of the 2000s, the Western Development Strategy was implemented in China.

The western area covers 6 provinces, which are Gansu, Guizhou, Qinghai, Shannxi, Sichuan, and Yunnan; 5 autonomous regions, which are Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang; and 1 municipality— Chongqing. It contains 71.4% of the Mainland China's area⁵.

Annual Percentage Change of Consumer Price Index (CPI): The data of the annual percentage change of CPI used in this study are from China Statistical Yearbook. These data show the degree of inflation reflecting the change in price. Later, this variable will be used as one the control variables in the regression analyses.

Rate of Unemployment: The data of unemployment in this study is the registered unemployment rate in cities and towns. They come from National Bureau of Statistics of China. This variable is a measure of the prevalence of unemployment, and it reflects the condition of the national labor force and the running of labor market. It will be used as one of the control variables in the regression analyses.

Engel's Coefficient: Data of Engel's Coefficient in this study is from China Statistical Yearbook. It is a reflection of the living standard. This variable will be used as one of the control variables in the regression analyses.

Since the implementation of Western Development, instead of funding to local government in west directly, the central government launches programs in western

⁵ Details of the Western Development Strategy are presented in Appendix 4.

area and invests with the capital within the central fiscal budget. It means the budget of Western Development is in the part of Central Expenditure. And Central Percent equals to one minus Local Percent.

4. Economic Growth, Government Policy and Regional Inequality

As mentioned in the previous section, there exist a similarity in the turning points of regional inequality and economic growth. However, it is hard to conclude that there is a relation between regional inequality and economic growth, simply drawing a conclusion from the similarity in the turning points. Still, this observation in the turning points can suggest a possible relation between regional inequality and economic growth. To pursue the investigation of the relations between economic growth, government policy, and regional inequality, the following hypotheses are posited.

Hypothesis 1: The growth of national economy may have a positive relation with the economic disparity among regions in China.

Hypothesis 2: The government policy about national macroeconomic development may have positive relation with regional inequality.

4.1 Empirical Analysis

The variables in the equation model are *National GDP*, which presents the growth of national economy; *Total Expenditure*, which presents the fiscal expenditure of central government; *Local Percent*, which presents the share of the fund that the central government allocate to local governments in total fiscal expenditure; *Engel's Coefficient*, the change of which quantitatively measures the change of living

standard in China; *Rate of Unemployment*, which shows the labor participation in economic behavior; *Annual Percentage Change of CPI*, which reflects the change of price in domestic market; *Western Development*, which present the effect of Western Development Strategy.

First, a correlation analysis of the variables is run to assess the existence and strength of the relation between the variables in the model. The result is as follows:

Table 8. National GDP, Local Percent, Total Expenditure, Engel's Coefficient, Rate of Unemployment, Annual Percentage Change of CPI and Theil Index

		GDP	Local Percent	Total Expenditure
Theil	Pearson Relation	0.711**	0.215	0.712**
Index	Sig. (2-tailed)	0.000	0.229	0.000
	N	33	33	33
		Engel's Coefficient	Rate of Unemployment	Growth Rate Of CPI
Theil	Pearson Relation	-0.624**	0.666**	-0.497**
Index	Sig. (2-tailed)	0.000	0.000	0.003
	N	33	33	33

*. Relation is significant at the 0.05 level (2-tailed)

**. Relation is significant at the 0.01 level (2-tailed).

Source: Original Data are from the Statistical Yearbooks of China and the Statistical Yearbooks of the different provinces.

The mean of the Theil Index is 0.1132 (SD = 0.048) and GDP has a mean amount of 90286.44 (SD = 2.0786E5). The coefficient of Pearson's correlation ($r=0.711$, $p=0.000$) suggests that the year with higher GDP tend to have bigger Theil Index,

whereas the year with lower GDP tend to have smaller Theil Index. The relation between the two variables (GDP and Theil Index) is significant.

The Local Percent has a mean amount of 65.6718 (SD = 10.69805). The coefficient of Pearson's correlation suggests that the years with higher Local Percent tend to have smaller Theil Index, whereas the year with lower Local Percent tend to have bigger Theil Index.

The Total Expenditure has a mean amount of 16739.5806 (SD = 2.30245E4). The coefficient of Pearson's correlation suggests that the years with higher Total Expenditure tend to have bigger Theil Index, whereas the year with lower Total Expenditure tend to have smaller Theil Index. The relation between the two variables is significant.

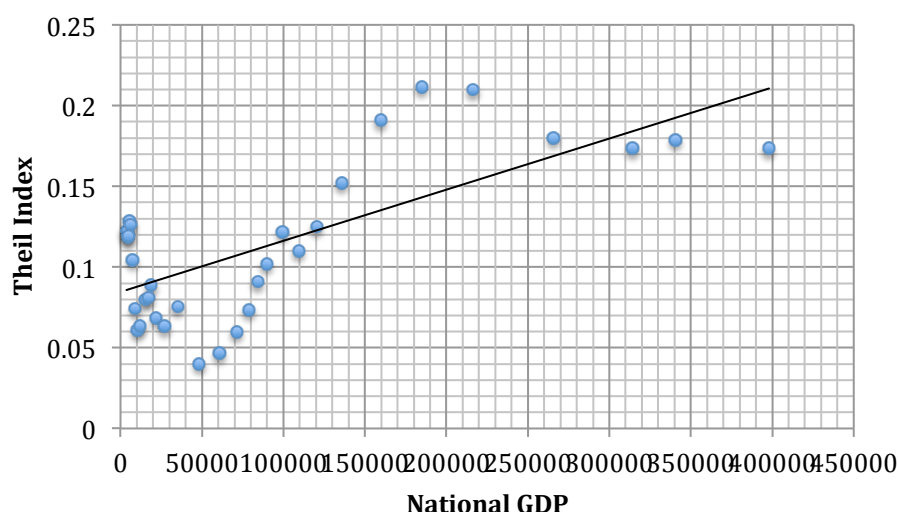
The Engel's Coefficient has a mean amount of 0.46296970 (SD = .095756359). The coefficient of Pearson's correlation suggests that the years with higher Engel's Coefficient tend to have smaller Theil Index, whereas the year with lower Engel's Coefficient tend to have bigger Theil Index. The relation between the two variables is significant.

The Rate of Unemployment has a mean amount of .03303030 (SD = 0.010088622). The coefficient of Pearson's correlation suggests that the years with higher Rate of Unemployment tend to have bigger Theil Index, whereas the year with lower Rate of Unemployment tend to have smaller Theil Index. The relation between the two variables is significant.

The Annual Percentage Change of CPI has a mean amount of 5.22121212 (SD = 6.425280032). The coefficient of Pearson's correlation suggests that the years with higher Annual Percentage Change of CPI tend to have smaller Theil Index, whereas the year with lower Annual Percentage Change of CPI tend to have bigger Theil Index. The relation between the two variables is significant.

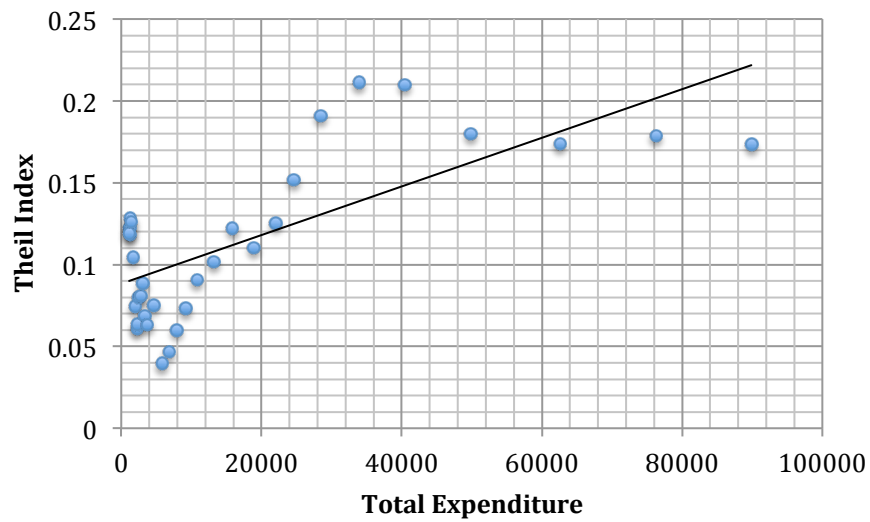
To supply visual explanation, graphs showing the correlation between the Theil Index and the indicators are as follows:

Graph 10. Theil Index and National GDP



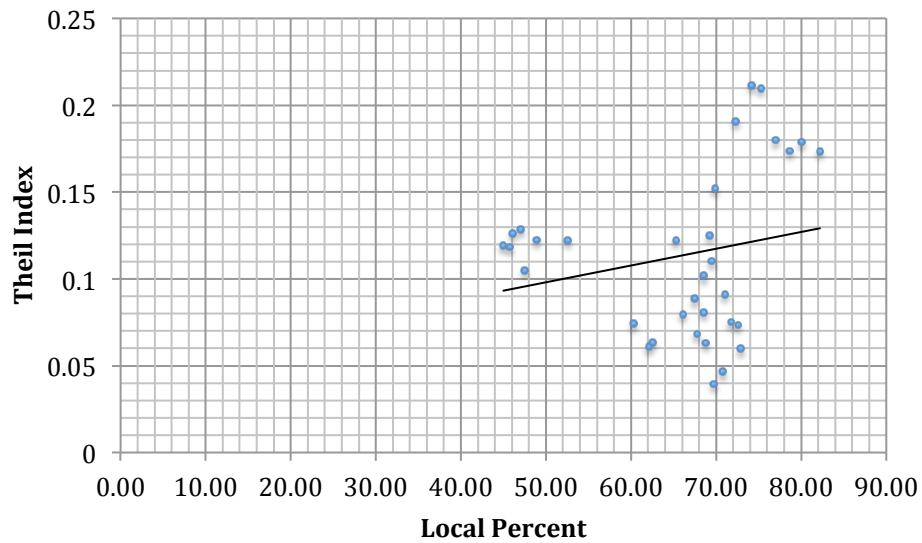
Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Graph 11. Theil Index and Total Expenditure



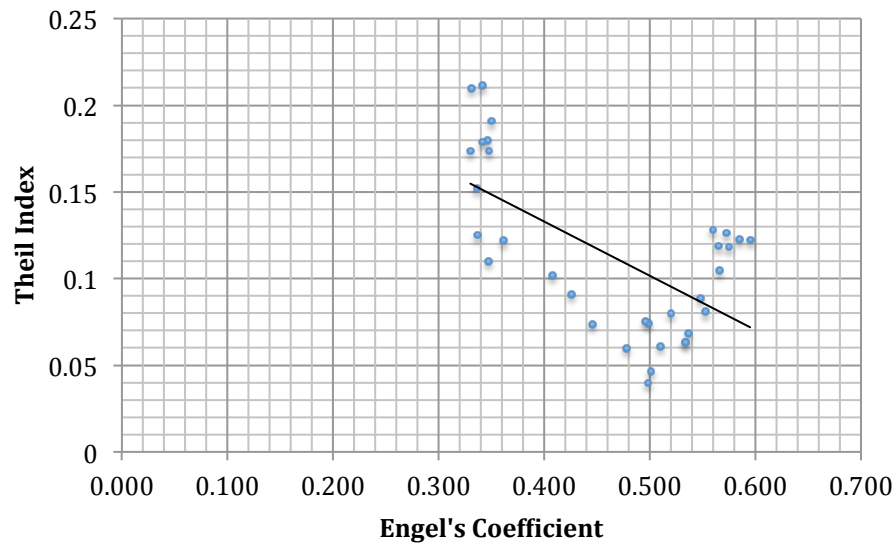
Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Graph 12. Theil Index and Local Percent



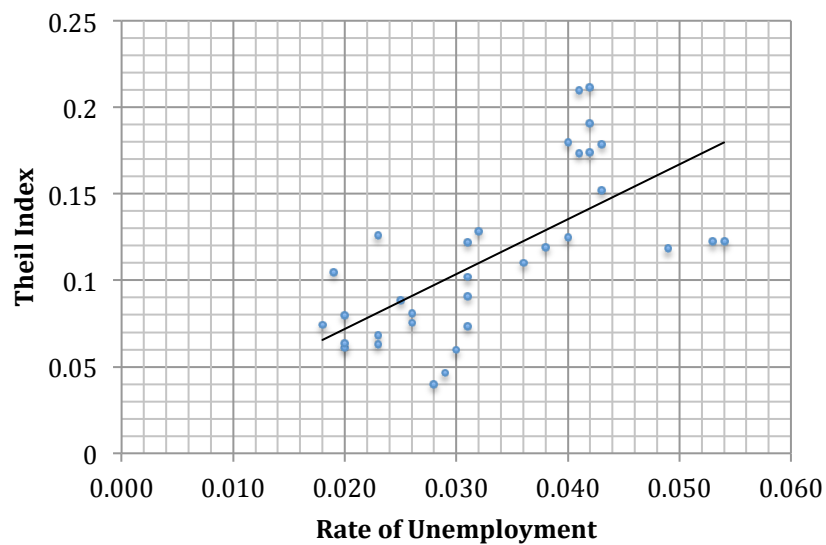
Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Graph 13. Theil Index and Engel's Coefficient



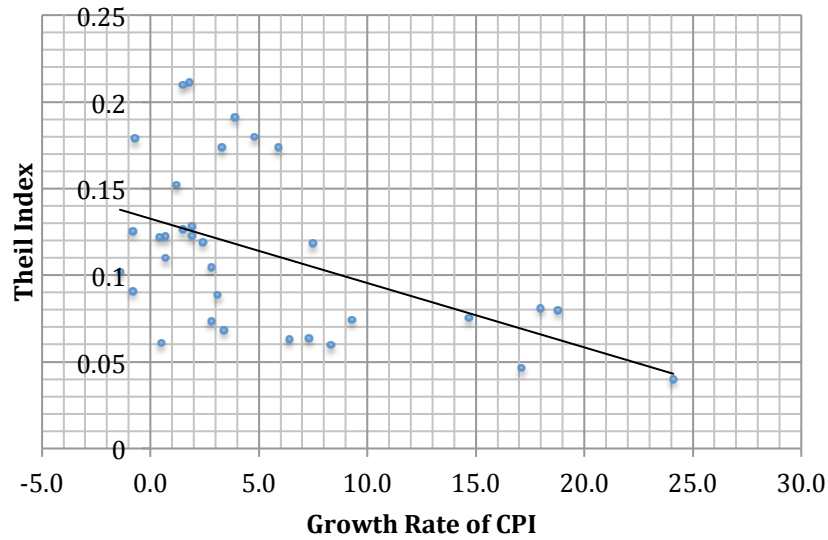
Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Graph 14. Theil Index and Rate of Unemployment



Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Graph 15. Theil Index and Growth Rate of CPI



Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

Based on the premise that there is a significant relation between the variables, to explore how the variables relate with each other, a specific model is required. In the model, Engel's Coefficient, Rate of Unemployment, and Annual Percentage Change of CPI are control variables.

$$\begin{aligned} \text{Theil Index} = & \alpha_0 + \alpha_1 * \text{GDP} + \alpha_2 * \text{Local Percent} + \alpha_3 * \text{Total Expenditure} + \alpha_4 * \text{Western} \\ & \text{Development} + \alpha_5 * \text{Engel's Coefficient} + \alpha_6 * \text{Rate of Unemployment} \\ & + \alpha_7 * \text{Annual Percentage Change of CPI} + \varepsilon \end{aligned} \quad (4.1.1)$$

The result is as follows:

Table 9. Regression Result of National GDP, Local Percent, Total Expenditure and Theil Index

Variable	<i>B</i>	Sig.	Std. Error
Constant	0.222	0.011	0.081
GDP	4.662E-7	0.260	0.000
Local Percent	-0.002	0.004	0.001
Total Expenditure	-1.268E-6	0.439	0.000
Western Development	0.065	0.001	0.017
Engel's Coefficient	-0.023	0.832	0.106
Rate of Unemployment	0.530	0.281	0.481
Annual Percentage Change of CPI	-0.001	0.246	0.001
F Value		22.959	
R Square		0.930	
Adjusted R-Square		0.865	
No. Observations		33	

Data Source: Original Data are from the China Statistical Yearbook and the Statistical Yearbooks of different provinces.

The linear regression model with the variables yields an $R^2 = 0.930$, $F = 22.959$, $p < 0.01$. It shows high fitting degree and significance. The detailed explanation of the regression model is in the following section.

4.2 Discussion

China is a communist country. The particularity of being ruled by a single party system is that the government policy and economic growth share an important relation. Don't even say that China has gone through a long period of planed

economy. A lot of habits in economic or fiscal system are inherited naturally. In China, the achievement of national economy can be mostly attributed to the government behavior, such as its support to building infrastructures, improvement in agriculture, R&D, etc., and the openness of China's market to the international market, which pushes marketization, globalization and some other aspects of its economy (Wu, 2003).

The linear regression model shows significant relation between dependent and independent variables. As the unit of Total Expenditure and GDP are same (100 million RMB), the coefficients in the table can be simply compared directly. It shows that the government policy has a stronger relation with regional economic inequality than the relation national economic growth share with regional economic inequality.

National GDP is used as the measure of national economic growth. There is a positive relation between National GDP and Theil Index in the period from 1978 to 2010. This relation can be understood as the greater the economic performance during a certain period of time, the greater the regional inequality during that period of time. One possible explanation of this relation is that economic growth directly shares highly positive relation with regional inequality.

However, economic growth is a concept on macroeconomic level. It brings a lot of other changes along with it. For example, economic growth may improve the education level of labor; the national growth may speed up the progress of technology; economic development may promote urbanization, industrialization, globalization, etc.. This supplies another possible explanation: economic growth

improved related factors such as human resource, technology, market, industry, etc., and these improvements increase regional inequality. In the regression model, there are three control variables that respectively present the change of price, living standard and labor force. More variables are welcomed in order to gain more accurate understanding of the intricate relation between economic growth and inequality.

Before discussing the relation between government policy and regional inequality, it is important to get some knowledge of China's fiscal system. In China's fiscal system, the local governments collect tax and hand out part of the income to the central government. They keep the remaining amount for their own support and development. The central government use the capital in two ways: one is to contribute to the fiscal budget of central government itself and the other way is to give back to the local government to support their development. It is an important process to make the decision on how to divide the total expenditure into local and central expenditure. The result of the decision-making can be seen as a reflection of government policy.

Since the structure of China's central government and local government is very complicated and unclear, it is hard to get the clear and real amount of fiscal transfer amount from the central government to every province. However, it is possible to get the share of the fiscal expenditure of regional governments from the central government and the fiscal expenditure used by the central government to invest in programs. Thus, the model uses Local Percent and Total Expenditure to show the intention or direction of government policy.

The model reveals a significant negative relation between Local Percent and the Theil Index in the period from 1978 to 2010. The observed negative relation indicates that there would be a greater regional inequality during the years that the central government provides fewer funds to the local governments. In other words, the funds central government used to support local economic development may have an effect on the reduction of economic differences or inequalities among regions.

The coefficient of Total Expenditure is negative. This indicates that government policy and regional economic inequality is negative. The central government plays a role to depress regional economic disparity in the period from 1978 to 2010.

The coefficient of Western Development Strategy is positive, and the relation between Western Development and Theil Index is significant. As mentioned earlier, the Western Development Strategy is supposed to be a policy with the effect of depressing economic inequality among regions. However, the coefficient does not prove it. Looking back at the Theil Index of the period: from 2001 to 2007, one can see that the Theil Index increased; until 2007, when it began to decrease. Therefore, one of the possible explanation can be that the Western Development Strategy may actually has an effect on the reduction of regional disparity, but because it was implemented only for comparatively a short time period, the effect is now obvious. Thus, it can be expected that in the coming future, the Western Development Strategy will be effective in diminishing economic disparity among provinces.

As a socialist country, China has been very sensitive about the balance in distribution of economic resource and social wealth. As early as in the 1950s, Mao

Zedong emphasized the importance of properly handling the relationship between coastal industries and inland industries in his famous article "On the Ten Major Relationships". He particularly made the following observation:

"About 70% of all the light industries and heavy industries are in the east coastal zone, only the left 30% are inland. Such irrational situation was made of the history. On one side, the coastal industrial base must be fully utilized, however, in order to balance the industrial development layout in national scale, the inland industries must be vigorously developed." (Mao, 1956).

National economic development should be moderate, balanced, and coordinated. Although it is a goal that is hard to be achieved, it is not impossible. In 2005, Chinese government particularly adopts an explicit objective of "harmonious development". A key dimension of this harmonious development is a balanced development across regions. The government should adopt a series of policies that is both moderately, regionally sloping and nationally coordinated. This is not only the best choice of the regional development strategy, but also a practical approach to narrow the gap between domestic regions.

Specifically, balanced regional economic development can be realized through these recommendations: First, reform the industrial structure in the developing regions, making them have the ability to survive in the market competition. Second, speed up the public facility in the less-developed areas to improve the investment environment, so as to attract more capital and labor inflows. Third, establish a more proper national fiscal and taxation institution to allocate resources efficiently. Last, but not least, when focusing on constructing the regional economy of the less-

developed areas, early-developed areas should not be ignored, that is, all the areas need to be considered as a whole.

5. Conclusion

Since 1978, China has put all the focus on constructing the national economy. As a result, the national economy of China has been growing quickly. However, with the high-speed growth, the unbalanced distribution of the domestic wealth in China becomes both a social and economic issue. For instance, in 2010, GDP per capita of Shanghai was as high as the GDP per capita of Saudi Arabia (73297 RMB); however, in Gansu province, the GDP per capita was equal to the GDP per capita of Iraq (16031 RMB).

There is a huge difference between being economically big and being economically strong. Certainly, for every country, the latter one would be the final and optimal goal. Then, to develop with balance becomes important. In China, a small proportion of the population, which is also concentrated in a small range of geographical location, possesses most of the social fortune. This economic polarization brings a variety of risk to the Chinese society. Although China is not the only country suffering from high-level social inequality, the economic inequality in Chinese society has a great socio-economic impact because of the relatively high number of poor from its large population. There is a need to seriously treat the discrepancy in wealth distribution in China in the process of national economic development.

This study has investigated the regional economic inequality in China, especially on the provincial level. After reviewing previous literature in the field, this study has calculated the Theil Index to assess the degree of regional economic inequality in China for each year, from 1978 to 2010. In the years before the beginning of 1990s,

economic difference among regions grew slowly; after the 1990s, the gap among regional economies quickly deepened.

This study has also explored the relation between economic inequality, economic growth, and government policy. First, the economic difference among regions in China is positively related to national economic growth. Second, the data analysis also has revealed that there is a relation between regional inequality and government policy.

This study has argued that even the expansion of regional economic inequality is hard to avoid. Still, if the government is aware of regional inequality and is determined to prevent it from getting worse, there is the possibility to redress the situation.

There are some limitations to the study itself. The concept of economic inequality may present some characteristics that have not been covered here. Similarly, the representation of government policy by fiscal expenditure and the use of GDP to represent national economic growth are too macroeconomic and lack details. The expenditure that central government allocates to local governments and central programs can hardly represent the overall effect of government policy. It will be better if more variables can be included.

Additionally, the relation between economic growth and economic inequality is very intricate. In the process of national development, the appearance of absolute economic difference can be expected to some extent and can be seen as a result of the accumulation of wealth or a source of economic development. The main purpose

of this study has been to find out the impact of the growing economy on regional inequality, and the counter effect of the inequality on economic growth has been ignored. Similarly, regional inequality can have influence on policymaking process of government too. This study only follows a single direction from government policy to inequality. Thus, the relation between the variables can only be partial correlations. Future study could improve on this point.

Generally, although, there are some factors induced in the model as control variables, it is sensible to believe that there are more factors related with regional economic inequality in long term. For example, the progress of technology, historical reasons, geographical condition, etc., can be important sources of regional inequality. More and further researches are required.

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APPENDIX 1 Main Policies of Domestic Economic Reform in China

1978: The Third Session of the Eleventh Central Committee of the Communist Party of China was held.

1979: Special Economic Zone in coastal area was established.

1982: The household contracted responsibility system with remuneration was established.

1984: Planned commodity economy was promoted.

1986: Reform of state-owned enterprise started.

1987: Principle as "one center and two basic points" was proposed.

1988: "The science and technology is the primary productive force" was raised.

1992: The goal of building socialist market economic system reform was set down.

1993: Start establishing a modern enterprise system in China.

1993: Reform of the tax system was carried out.

1993: Proposed the goals of reform of financial system.

1994: Reform of health care and housing market was implemented.

1995: Proposed the target as "two fundamental changes in China".

1997: Reform of institution of ownership in China started.

1999: Confirm the importance of non-public economy in socialist market economy.

1999: The Western Development Strategy was proposed.

2001: China officially became a WTO member.

2002: Set down the goal to build a moderately prosperous society in China.

2003: Proposed reform of industry in Northeast China and other old industrial bases.

2004: Nine Financial State was promulgated.

2004: Shareholding system reform of state-owned commercial banks.

2004: To protect private property was wrote into the Constitution.

2005: Abolition of agricultural tax.

2005: Proposed to build a new socialist countryside.

2005: Reform of non-tradable shares was carried out.

2006: To build a socialist harmonious society was proposed.

2007: Real Right Law came to power.

2007: Scientific development concept into the Constitution.

2008: Reform to stabilize the capital market.

2010: Reform of monopoly industries.

(Source: Information is collected from Economic Reform of Contemporary China, Wu, 2003, Shanghai: Shanghai Yuandong Press)

Appendix 2 Main Policies of Opening Up in China

1979: The "Agreement on Sino-US trade relations" was signed in Beijing, and China and the United States decided to give each other the most favored nation treatment.

1980: The first Sino-foreign equity joint venture - Beijing Air Catering Co., Ltd. was established with the approval of Chinese government formally.

1982: In the twenty-second session of the Standing Committee of National People's Congress passed the institutional reform that proposed by the State Council to merge the Import and Export Management Committee, the Ministry of Foreign Trade, Ministry of Foreign Economic Relations and Foreign Investment Management Committee as Ministry of Foreign Economics and Trade of China.

1983: The Sino-US Joint Committee on Commerce and Trade was held its first session in Beijing.

1984: The CPC Central Committee and the State Council jointly recommended to further open up 14 coastal port cities from north to south.

1985: The State Council promulgated the Management Regulations of Foreign Banks and Joint Venture Banks in Special Economic Zones, allowing foreign banks establish business branches in Shenzhen, Zhuhai, Xiamen, Shantou and Hainan.

1986: In order to further improve the investment environment, the State Council issued " The rules to encourage foreign investment " to clarify the relevant preferential policies for foreign-invested enterprises in the official form of administrative regulations.

1987: Ministry of Foreign Trade and Economic Cooperation of China (MOFTEC) specialized foreign trade corporation for an export contract responsibility system implemented.

1988: Food storage, textiles, garments, light industrial products, metals and chemicals, electronics, health care Export Commerce was approved by the Ministry of Foreign Trade.

1990: The development of Pudong District was officially carried out.

1991: China's largest joint venture in automobile industry – First Automobile Workshop (FAW) was formally established in Changchun, Volkswagen Automotive Co., Ltd. share 40 percent of the total investment.

1992: South Tour Speeches were delivered in Deng Xiaoping's southern tour China's opening up entered into a new journey from coastal areas to inland.

1993: The largest integrated global investment bank Merrill Lynch's office officially opened in Shanghai, which is the first representative office that the Wall Street opened in China.

1994: The Eighth NPC Standing Committee pass through the "Foreign Trade Law", on the maintenance of foreign trade order and promoting the development of foreign trade.

1994: Comprehensive reform of foreign trade system was implemented.

1996: Significant progress was made in foreign exchange management system reform.

1996: China began to accept the VIII terms of the IMF Agreement, adopted RMB convertibility under the current account.

1999: Approved by the former Ministry of Foreign Trade, the first batch of 20 private enterprises got the self-supported import and export right, which means the private enterprises started to enjoy the same treatment as state-owned and collective enterprises. This marks the first time the private economy in the country legally acquired the right to directly engage in foreign trade.

2001: The accession of China to the World Trade Organization (WTO) was considered and approved in the Fourth WTO Ministerial Conference. On December 11, China officially became the 143rd member of the WTO. With the joining, the various laws and regulations of WTO also came into effect in China.

2003: The Eleventh National People's Congress decided to combine the original functions of the Ministry of Foreign Trade and the former State Planning

Commission, State Economic and Trade Commission part as the Ministry of Commerce.

2005: China began to implement a market-based, according to the principle of a basket of currencies, to manage the exchange rate system floatingly.

2006: The transitional period of WTO accession of China came to end. China's banking sector begin to fully open to the foreign banks. And all the geographical and customer restrictions to run RMB business in China were expired.

(Source: Information is collected from Economic Reform of Contemporary China, Wu, 2003, Shanghai: Shanghai Yuandong Press)

APPENDIX 3 Partial Relation Analyses of Variables

Table 10. Partial Relation of GDP Per Capita, GDP and Total Expenditure

		Total		
	Variables:	GDP Per Capita	GDP	Expenditure
Theil	Relation	0.491	0.497	0.505
Index	Significance (2-tailed)	0.007	0.006	0.005
	df	27	27	27

Control Variables: Annual Percentage Change of CPI, Rate Of Unemployment, Engels Coefficient, Output Value Of Tertiary Industry

Data Source: Original Data are from China Statistical Yearbook and Statistical Yearbooks of different provinces.

Table 11. Partial Relation of Local Expenditure, Local Percent, Central Expenditure and Central Percent

		Local	Local	Central	Central
	Variables:	Expenditure	Percent	Expenditure	Percent
Theil	Relation	0.486	-0.119	0.602	0.119
Index	Significance (2-tailed)	0.008	0.540	0.001	0.540
	df	27	27	27	27

Control Variables: Annual Percentage Change of CPI, Rate Of Unemployment, Engels Coefficient, Output Value Of Tertiary Industry

Data Source: Original Data are from China Statistical Yearbook and Statistical Yearbooks of different provinces.

APPENDIX 4 The Western Development Strategy

In November 1999, the Central Economic Work Conference finalized the strategic decision-making for large-scale development in the western area. The implementation of Western Development Strategy is directly related to the growing domestic demand and speeding up of national economic growth. The Chinese government delivered the message that the Western Development would be placed at a prominent position. From the overall situation, the central government of China stated that the strategy of Western Development need to be implemented with fully aware of the significance and as an important strategic task of the Communist party and the nation.

Graph 16. Map of West China



Source: <http://www.hotelstravel.com/china-we.html>

The western area of China covers 71.4% of the whole territory of the country—about 6.85 million square kilometers. In the end of 2002, the population of western area reached 367 million, accounting for 25% of the national population.

The natural resource in west China is very rich, especially in mineral resources. The potential value of the mineral reserves in western area accounted for 50.45% of the national gross mineral reserve. Additionally, China's proven natural gas reserve is ranked sixteenth in the world, while 64.5% of the country's total gas reserve is in western area. Besides, the western region accounted for 82.5% of the country's hydropower resource, of which China is in the first place in the world. West China historically plays a role as resource and energy storage in the process of China's industrialization and modernization.

Compare with the vast tertiary and sufficiency of natural resource, the gross domestic product of west China only share about 15 to 20 percent of national GDP in the period from 1978 to 2010. Both the economic growth and social development in west China are falling far behind of the other areas. According to the report of National Development and Reform Commission of China, by the end of 2005, the poverty-stricken population in eastern, central, western and northeastern regions were separately 1.42 million, 6.68 million, 14.21 million, 1.34 million, the incidence of poverty in the four regions were 0.4%, 2.4%, 5.0%, 2.4%. What's more, the poverty-stricken population in the western region accounted for 60.1% of the rural poor. It is urgent to accelerate the pace of economic reform, opening up and modernization in the west.

Table 12. Share of National Gross Domestic Product in 1985 and 2005

Year Region	1985	2005
East	51.96%	59.52%
Central	29.69%	23.49%
West	18.35%	16.99%

Data Source: China Statistical Yearbook.

Under this background, the State Council of China set up a leading group of Western Development Strategy— the Western Development Office of the State Council officially began its operation in March 2000, after the examination and decision about the Western Development Strategy of National People's Congress.

With the general objective as to basically realize the modernization in the western area, significantly narrow the gap among regions, the overall plan of large-scale development in the western area covers 50 years. It can be divided into three phases.

From 2001 to 2010, the foundation stage, in which the focus is on the structural adjustment of regional economy, and improve the infrastructure, ecological environment, science and technology inducement, education facilities to establish and systemize the local market.

From 2011 to 2030—the acceleration stage of development, western area is expected to consolidate and improve the economic foundation, cultivate the local industries, and implement ecological and professional comprehensive upgrade of economy.

The third stage is from 2031 to 2050-- modernization stage. The western area is planned to join the global market overall to increase the capability to self-support and self develop, to generally increase the production and living standards of the people in the west, comprehensively reduced the gap between west and east China.

Until 2009, the country has newly started more than seventy key projects, with total investment about 1 trillion (RMB). And the central government put financial construction funds a total of 550 billion (RMB), financially transferred payment about 750 billion (RMB), loosed long-term construction treasury bonds for about 310 billion (RMB). All these strong supports for the economic development of the eastern and central regions maintain stable and rapid economic growth in domestic China (Wen, 2005).

A lot of scholars, who study Western Development policy of China, believe that the accurate measurement of the achievement of it is not necessary or possible, the most important contribution of Western Development Strategy should be reflected as the strategic policy creates a strong atmosphere for the economic development (Chen, 2009; Lin and Ren, 2009). Besides direct support from central government, the propaganda to the public gained a lot of concern from inside China and the outside. Because of Western Development Strategy, investment and labor start inflowing in west. These achievements have laid a solid foundation for the further development of the western economy.

국문초록

중국의 경제 성장, 정부 정책과 지역 경제 차이

이 연구는 두 가지 목적이 있다. 첫 번째 목적은 1978 년부터 2010 년까지 중국의 지역 경제 차이의 경향을 연구하는 것이고, 두 번째 목적은 경제 성장, 정부 정책과 중국 지역 경제 차이의 관계를 분석하는 것이다.

제 1 장에서는 본 연구의 배경이 도입된다. 중국에서 경제 활동의 지리적 불균형이 크다. 이런 지역 경제 차이가 중국 경제와 사회에 매우 중요한 영향을 끼친다. 생활 조건, 자원 기반 및 소득 수준과 경제 성장의 다른 지표들이 지역적으로 차이가 난다. 본고는 1978 년부터 2010 년까지 중국의 지역 경제 차이를 연구 대상으로 한다.

제 2 장에서는 중국의 경제 발전의 지역 패턴이 소개한다. 지역(Area) 수준과 성(Province)의 수준에서 중국의 차이화된 지역성장을 제시하기 위해 Theil 지수를 도입한다. Theil 지수 통해 중국의 지역 경제의 차이를 측정한 결과 지역 경제성장의 불균형이 나타난다 - 지역 경제 발전의 차이는 1990 년 이전에는 적었으나 1990 년 후에 심각해지는 경향을 보인다. 이 장에서 연구중에 나타나는 변수들도 소개하게 된다.

제 3 장에서는 선행 연구들을 검토를 한다. 경제적 차이의 이론들과 경제 성장, 정부 정책과 경제 차이의 논쟁들에 대해서 리뷰를 한다.

이어서, 제 4 장에서는 회귀분석을 통해서 경제 성장, 정부 정책과 지역경제 차이와의 관계를 검토를 한다. 회귀 분석 결과는 중국의 국가 경제 성장은 지역 경제 격차의 확대에 긍정적인 역할을 있고 정부정책은 지역 차이에 부정적인 효과가 있다고 한다는 것을 증명을 한다. 즉, 1978 년부터 2010 년까지 경제 성장은 지역 경제 차이를 확대 시켰고, 정부정책은 지역 경제 차이를 감소 시켰다.

결론적으로 중국의 지방 경제 성장의 차이가 국가의 성장과 정부 정책과 관련이 깊다. 그리고 중국에서 국가 경제 성장이 지방 사이에 경제적 차이를 크게 끌어낸다. 하지만 정부 정책은 지역 경제 차이가 감소되는 추세와 긍정적인 관계가 있다.

주요어: 지역 경제 차이, 경제 성장, 정부정책, Theil 지수.

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